CLIMATE CLASSIFICATION

Objective:	To use average monthly temperature and precipitation data to classify climates with the Köppen climate classification system.
Resource:	Internet access (optional).
Reference:	McKnight and Hess, *Physical Geography*, 8th ed., pp. 200–238

KÖPPEN CLIMATE CLASSIFICATION SYSTEM

The **modified Köppen system** is the most widely used climate classification system. With the Köppen system, all climates of the world can be grouped into just 15 types, based simply on **average monthly temperature** and **average monthly precipitation**.

In the Köppen system, each climate type is given a descriptive name, as well as a code based on two or three letters. The first letter refers to the major climate group, the second letter generally refers to the precipitation pattern, and the third letter generally refers to the temperature pattern.

There are actually several different versions of the modified Köppen system in use—the definitions of some climate types vary slightly from version to version. Also, while there are specific boundaries for each climate type, in reality the borders between climates should be thought of as transition zones, rather than sharp boundaries.

CLIMOGRAPHS

One of the key tools used in climate study is the **climatic diagram** or **climograph** (Figure 1). In a single chart, the climatic regime of a location can be summarized. The months of the year are indicated along the bottom. The average monthly temperature is shown with a solid line (the temperature scale is along the left side of chart), and the average monthly precipitation is indicated with bars (the precipitation scale is along the right side of chart).

In the sample diagram, notice that in St. Louis the average temperature in January is about −1°C (30°F), while in July the average temperature is 27°C (80°F). Precipitation is evenly distributed throughout the year, each month receiving approximately 8 to 13 centimeters (3–5 inches).

USING THE MODIFIED KÖPPEN SYSTEM CHARTS

Each of the climate types in the Köppen system has a specific definition. The "Modified Köppen System Charts" on the following pages of the Lab Manual provide concise definitions for 14 climate types (plus the special category of "Highland" climate). ***In order to use these charts you must follow the procedure for classifying climates listed below.***

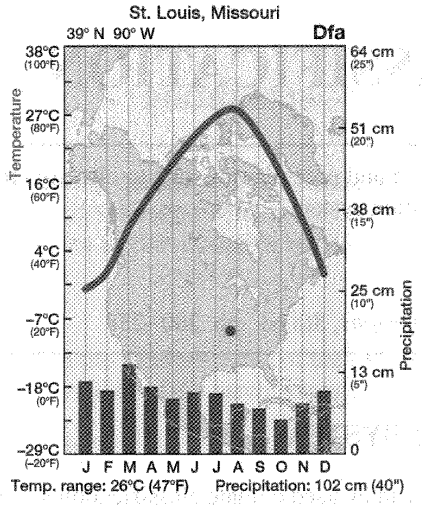


Figure 1: Climograph for St. Louis, Missouri. (From McKnight and Hess, *Physical Geography*, 8th ed.)

At the top of each chart, the basic definition for the major climate group is given. Next, the different climate types found within the major group are listed (in some cases a climate type is represented by several different letter combinations). Finally, the specific definitions of the second and third letters for each climate type are provided. Note that the "C" and "D" climates have been grouped together, and that not all second and third letters can be combined with both C and D.

PROCEDURE FOR CLASSIFYING CLIMATES

Construct a climograph for the location by plotting the average monthly temperature and average monthly precipitation (this step is actually optional, but it usually makes classification easier). Then, calculate the average annual temperature and average annual precipitation for the location. (This has been done for you in the problems for this exercise.)

Next, determine the major climate group. If you go through the following steps ***in sequence***, you will find the correct major climate group. With experience, you will learn shortcuts to narrow your choices more quickly:

1. If the average temperature of ***every*** month is below 10°C (50°F), go to the "E" climate chart. (Note: some "H" climates may also exhibit this temperature pattern.)
2. If the total annual precipitation is ***less*** than 89 centimeters (35 inches), continue to #3; if the total annual precipitation is ***more*** than 89 centimeters (35 inches), continue to #4.

3. Determine if it is a dry climate by using the "Dry Climate Boundary Charts." If it is a dry climate, continue with the "B" climate chart; if not a dry climate, continue to #4. (A detailed description of dry climates and using these charts is given below.)
4. If the average temperature of ***every*** month is above 18°C (64.4°F), go to the "A" climate chart.
5. If at least one winter month is colder than −3°C (26.6°F), go to the "D" climate chart.
6. If the coldest winter month is between −3°C (26.6°F) and 18°C (64.4°F), go to the "C" climate chart.

After establishing the major climate group, determine which climate type is correct by checking the definitions of the second, and if necessary, third letters. When assessing seasonal patterns of temperature or precipitation, be sure to consider if the station is in the Northern or Southern Hemisphere. If you are unsure of the hemisphere of the station in question, look at the temperature pattern. If the coolest months are in December, January, and February, it is in the Northern Hemisphere. If the coolest months are in June, July, and August, it is in the Southern Hemisphere.

CLASSIFYING DRY CLIMATES IN THE KÖPPEN SYSTEM

The basic definition of a dry ("B") climate in the Köppen system is one in which the **potential evaporation** exceeds **precipitation**. There is a complex relationship between temperature, precipitation, and the dryness of a region. For example, because of the lower potential for evaporation, a very cold region with an average annual precipitation of 25 centimeters (10 inches) would not be classified as a dry climate, while a hot region receiving 25 centimeters (10 inches) of precipitation would be. These relationships are shown on the "Dry Climate Boundary Charts."

In order to use the "Dry Climate Boundary Charts," you need to know the average annual precipitation, the average annual temperature, and if there is a "seasonal concentration" of precipitation. A seasonal concentration means that more than 70% of the precipitation comes in either the six summer months or six winter months. For purposes of classification, April to September are considered the six summer months in the Northern Hemisphere. (These would be the six winter months in the Southern Hemisphere.)

To determine if a seasonal concentration is present, add up the precipitation amounts for the months April to September, and divide this by the total annual precipitation. For example, if a Northern Hemisphere location with annual precipitation of 38 centimeters (15 inches) receives 30 centimeters (12 inches) of rain between April and September, make the following calculation: 30 cm/38 cm = 0.8 or 80% (12"/15" = 0.8 or 80%). Since more than 70% of the precipitation comes between April and September, this location has a summer concentration of rainfall.

Modified Köppen System Charts

(Use in the sequence outlined in "Procedure for Classifying Climates")

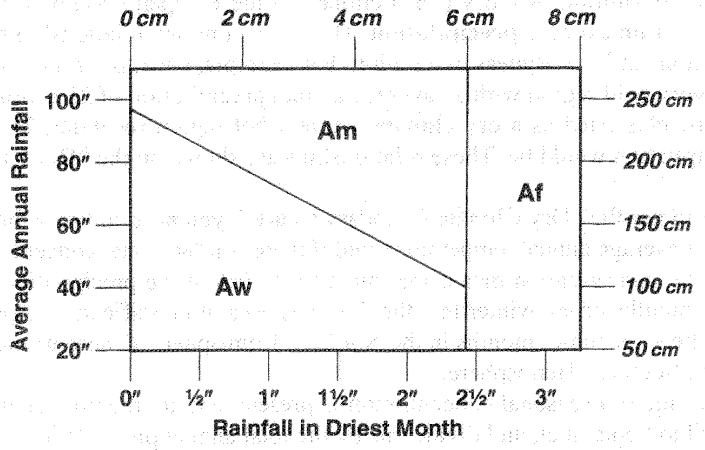
A—TROPICAL HUMID: Temperature of every month above 18°C (64.4°F).

Group A Climate Types

Af —Tropical Wet
Am—Tropical Monsoon
Aw —Tropical Savanna

Second Letters	**Definition**
f —Wet All Year	Every month has at least 6 cm (2.4") of rainfall.
m—Monsoon Pattern	Short dry season; pronounced rainy season.*
w—Winter Dry	Winter dry season of 3 to 6 months.*

*To calculate boundaries between "Am" and "Aw," determine the average rainfall and the average rainfall of the driest month; then use the chart below. For example, a location with an average annual rainfall of 200 cm (about 80") and 5 cm (2") of rainfall in the driest month is an "Am" climate.



B—DRY CLIMATES: Evaporation exceeds precipitation.

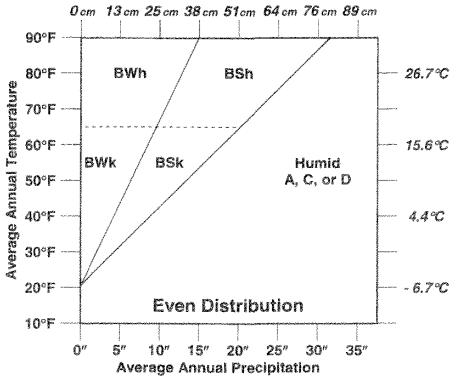
Group B Climate Types

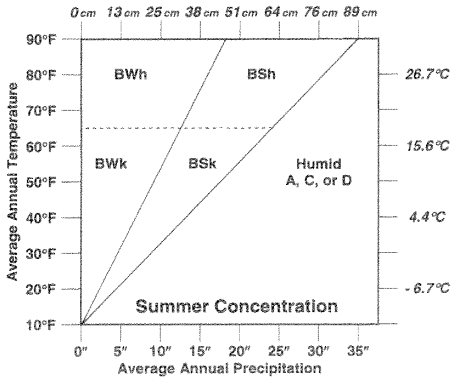
BWh—Subtropical Desert	(Ave. annual temperature above 18°C [64.4°F]).
BSh —Subtropical Steppe	" " " " "
BWk—Midlatitude Desert	(Ave. annual temperature below 18°C [64.4°F]).
BSk —Midlatitude Steppe	" " " " "

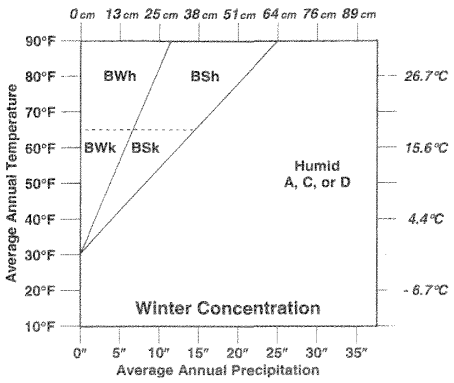
DRY CLIMATE BOUNDARY CHARTS

1. Determine the average annual temperature and average annual precipitation.
2. Determine if the precipitation is distributed evenly during the year:
   (a) If more than 70% of the precipitation comes in the 6 summer months (April to September in Northern Hemisphere), use "Summer Concentration" chart.
   (b) If more than 70% of the precipitation comes in the 6 winter months (October to March in Northern Hemisphere), use "Winter Concentration" chart.
   (c) If precipitation is evenly distributed throughout year (neither a or b), use "Even Distribution" chart.
3. Line up the average annual temperature with the average annual precipitation to find the climate.

Example: If a location has an annual precipitation of 38 cm (15") with a winter concentration, use the "Winter Concentration" chart. If the average annual temperature is 21°C (70°F), the climate is BSh; if the average annual temperature is 10°C (50°F), it is not a dry climate.







C—MILD MIDLATITUDE:

Temperature of warmest month above 10°C (50°F); coldest month between −3°C (26.6°F) and 18°C (64.4°F).

D—SEVERE MIDLATITUDE:

Warmest month above 10°C (50°F); coldest month below −3°C (26.6°F).

Group C & D Climate Types

Cs — Mediterranean	(includes Csa and Csb)
Cfa — Humid Subtropical	(also includes Cwa)
Cfb — Marine West Coast	(also includes Cfc)
Dfa — Humid Continental	(also includes Dwa, Dfb, and Dwb)
Dfc — Subarctic	(also includes Dwc, Dfd, and Dwd)

Second Letters	**Definition**
s—Summer Dry	Wettest winter month has at least 3× precipitation of driest summer month.
w—Winter Dry	Wettest summer month has at least 10× precipitation of driest winter month.
f—Wet All Year	Neither "s" nor "w" above.

Third Letters	**Definition**
a—Hot Summer	Warmest month above 22°C (71.6°F).
b—Warm Summer	Warmest month below 22°C (71.6°F); at least 4 months above 10°C (50°F).
c—Cool Summer	Warmest month below 22°C (71.6°F); 1 to 3 months above 10°C (50°F); coldest month above −38°C (−36.4°F).
d—Severe Winter	Coldest month below −38°C (−36.4°F).

E—POLAR CLIMATES:

Temperature of every month below 10°C (50°F).

Group E Climate Types

ET—Tundra
EF—Ice Cap

Second Letters	Definition
T—Tundra	At least one month above 0°C (32°F).
F—Ice Cap	All months below 0°C (32°F).

H—HIGHLAND CLIMATES:

Significant variation or modification of a climate type due to high elevation.

Highland climates are not defined in the same way as other climates in the Köppen system. Rather, these are regions in high mountain areas where the climate has been significantly modified from the adjacent lowlands by high elevation.

FINAL SUGGESTIONS ON CLIMATE CLASSIFICATION

You may also want to compare the climograph of the station in question with those in your textbook. This is a quick way to determine if your classification is reasonable. If you know the location of the station in question, look at the generalized map of climate inside the front cover of the Lab Manual. This map may help narrow down the climate type to several possibilities. However, because there are local variations in climate, this map alone is *not* enough to accurately determine all climates. You will need to use the charts defining each climate type to verify your answer.

KÖPPEN CLASSIFICATION AND CLIMATE CONTROLS

Köppen climate classification is based solely on temperature and precipitation patterns. Although the Köppen system does not consider the origin of a climate, the location and dominant controls of each climate type are quite predictable.

This regularity is illustrated with the **hypothetical continent** shown in Figure 2. This idealized distribution pattern predicts quite closely the actual arrangement of climate types on the continents, and reflects the dominant controls that produce each of these climates. These dominant controls include latitude, continent-ocean temperature contrasts, ocean currents, the general circulation of the atmosphere, and the most important kinds of storms.

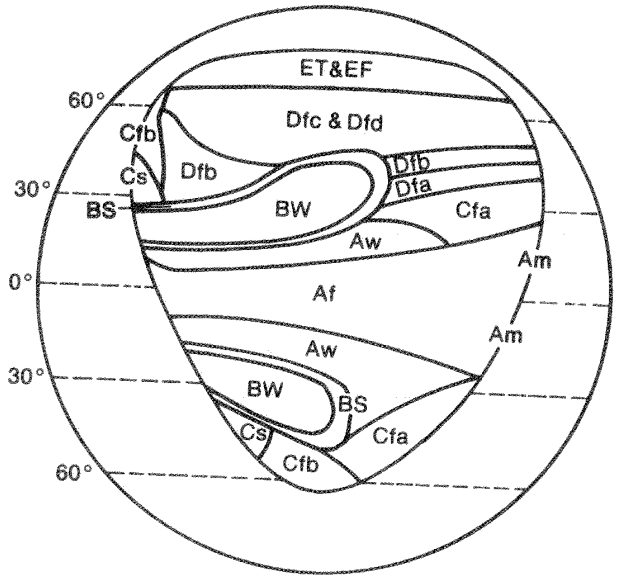


Figure 2: The presumed arrangement of Köppen climatic types on a hypothetical continent. (From McKnight, *Physical Geography*, 4th ed.)

Name _____ Section _____

PROBLEMS—PART I

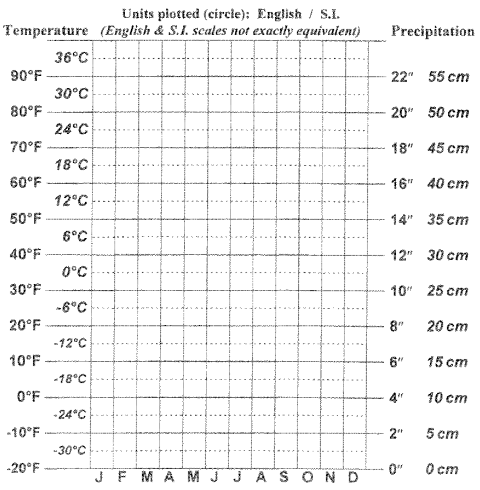
For each of the following six locations, complete the climograph using the average monthly temperature ("Temp") given in degrees Celsius and Fahrenheit, and the average monthly precipitation ("Precp") given in centimeters and inches. The average annual temperature and precipitation are provided for you. After completing the climographs, answer the questions at the end of Part I. You may plot data on the climographs using either S.I. or English (note that the English unit and S.I. unit scales on the climographs are not exactly equivalent). It may be helpful to locate each of these stations on a map. No "H" climates are given.

1. Cuiabá, Brazil — Average Annual: 26°C (78°F); 138.8 cm (54.6″)

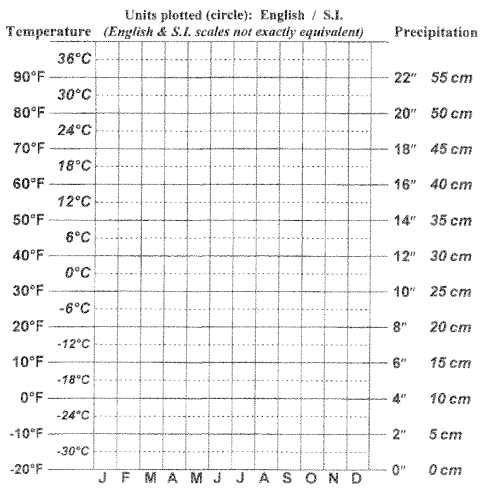
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Temp	81°F *27°C*	80°F *27°C*	81°F *27°C*	80°F *27°C*	75°F *24°C*	72°F *22°C*	73°F *23°C*	75°F *24°C*	79°F *26°C*	82°F *28°C*	81°F *27°C*	81°F *27°C*
Precp	9.6″ *24.4 cm*	8.9″ *22.6 cm*	8.1″ *20.6 cm*	4.1″ *10.4 cm*	2.0″ *5.1 cm*	0.3″ *0.8 cm*	0.2″ *0.5 cm*	1.1″ *2.8 cm*	2.0″ *5.1 cm*	4.4″ *11.2 cm*	6.0″ *15.2 cm*	*7.9″* *20.1 cm*

2. Kashi (Kashgar), China — Average Annual: 12°C (54°F); 8.7 cm (3.4″)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Temp	22°F *−6°C*	34°F *1°C*	47°F *8°C*	61°F *16°C*	70°F *21°C*	77°F *25°C*	80°F *27°C*	76°F *24°C*	59°F *15°C*	56°F *13°C*	40°F *4°C*	26°F *−3°C*
Precp	0.3″ *0.8 cm*	0.0″ *0.0 cm*	0.2″ *0.5 cm*	0.2″ *0.5 cm*	0.8″ *2.0 cm*	0.4″ *1.0 cm*	0.3″ *0.8 cm*	0.7″ *1.8 cm*	0.3″ *0.8 cm*	0.0″ *0.0 cm*	0.0″ *0.0 cm*	0.2″ *0.5 cm*



1. Cuiabá, Brazil



2. Kashi (Kashgar), China

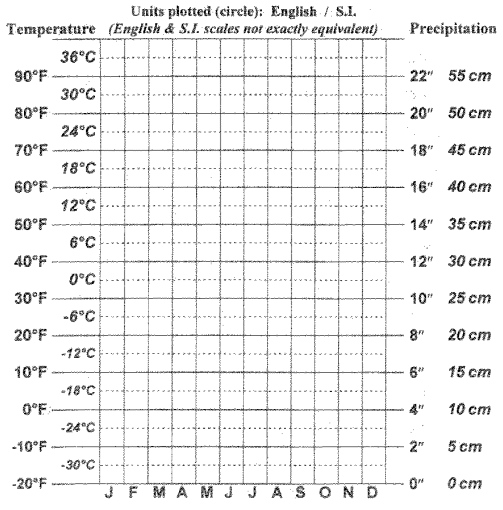
Climate Classification

3. New Orleans, Louisiana												Average Annual: 21°C (70°F); 161.8 cm (63.6″)
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Temp	56°F *13°C*	58°F *14°C*	63°F *17°C*	70°F *21°C*	76°F *24°C*	82°F *28°C*	83°F *28°C*	83°F *28°C*	80°F *27°C*	73°F *23°C*	62°F *17°C*	57°F *14°C*
Precp	4.8″ *12.2 cm*	4.2″ *10.7 cm*	6.6″ *16.8 cm*	5.4″ *13.7 cm*	5.4″ *13.7 cm*	5.6″ *14.2 cm*	7.1″ *18.0 cm*	6.4″ *16.3 cm*	5.8″ *14.7 cm*	3.7″ *9.4 cm*	4.0″ *10.2 cm*	4.6″ *11.9 cm*

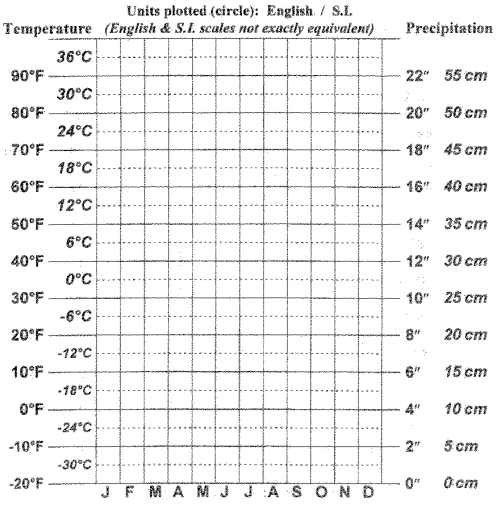
4. Palau, Caroline Islands												Average Annual: 27°C (81°F); 396.2 cm (155.9″)
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Temp	81°F *27°C*	80°F *27°C*	81°F *27°C*	82°F *28°C*	82°F *28°C*	82°F *28°C*	81°F *27°C*	81°F *27°C*	81°F *27°C*	81°F *27°C*	81°F *27°C*	81°F *27°C*
Precp	15.3″ *38.9 cm*	9.4″ *23.9 cm*	6.8″ *17.3 cm*	7.6″ *19.3 cm*	15.5″ *39.4 cm*	12.4″ *31.5 cm*	19.9″ *50.5 cm*	14.0″ *35.6 cm*	15.7″ *39.9 cm*	14.8″ *37.6 cm*	11.8″ *30.0 cm*	12.7″ *32.3 cm*

5. Irkutsk, Siberia												Average Annual: 0°C (31°F); 37.0 cm (14.6″)
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Temp	−5°F *−21°C*	1°F *−17°C*	17°F *−8*	37°F *3°C*	48°F *9°C*	59°F *15°C*	65°F *18°C*	60°F *16°C*	48°F *9°C*	33°F *1°C*	13°F *−11°C*	1°F *−17°C*
Precp	0.6″ *1.5 cm*	0.5″ *1.3 cm*	0.4″ *1.0 cm*	0.6″ *1.5 cm*	1.2″ *3.0 cm*	2.3″ *5.8 cm*	2.9″ *7.4 cm*	2.4″ 6.1 *cm*	1.6″ *4.1 cm*	0.7″ *1.8 cm*	0.6″ *1.5 cm*	0.8″ *2.0 cm*

6. Dublin, Ireland												Average Annual: 9°C (48°F); 70.4 cm (27.7″)
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Temp	40°F *4°C*	41°F *5°C*	42°F *6°C*	45°F *7°C*	49°F *9°C*	55°F *13°C*	58°F *14°C*	57°F *14°C*	54°F *12°C*	48°F *9°C*	44°F *7°C*	41°F *5°C*
Precp	2.2″ *5.6 cm*	1.9″ *4.8 cm*	1.9″ *4.8 cm*	1.9″ *4.8 cm*	2.1″ *5.3 cm*	2.0″ *5.1 cm*	2.6″ *6.6 cm*	3.1″ *7.9 cm*	2.0″ *5.1 cm*	2.6″ *6.6 cm*	2.9″ *7.4 cm*	2.5″ *6.4 cm*

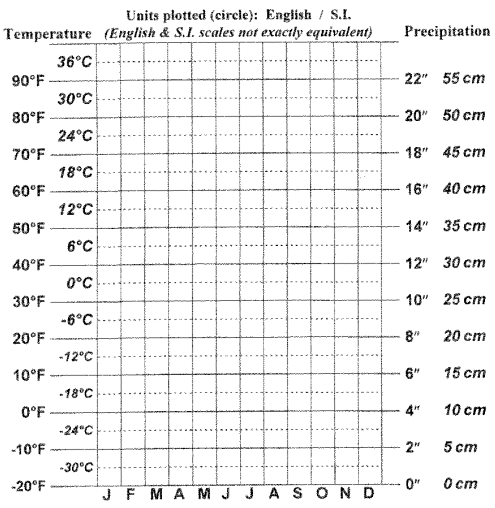


3. New Orleans, LA

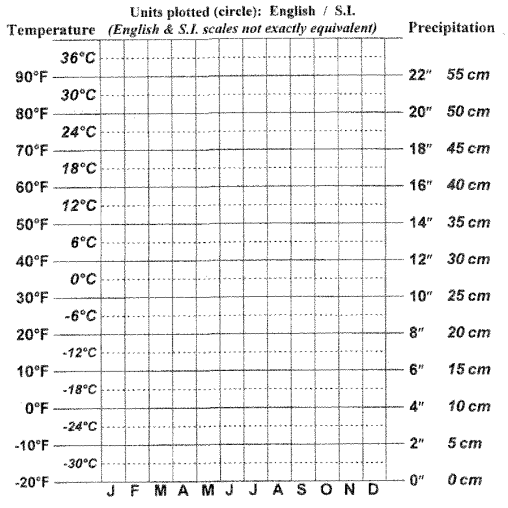


4. Palau, Caroline Islands

Name _____ (Part I)



5. **Irkutsk, Siberia**



6. **Dublin, Ireland**

After completing the climographs, answer the following questions about each location:

1. **Cuiabá, Brazil:**

   (a) Köppen climate type: Letter code: _____

   Descriptive name: _____

   (b) Dominant climate controls for this location:

2. **Kashi (Kashgar), China:**

   (a) Köppen climate type: Letter code: _____

   Descriptive name: _____

   (b) Dominant climate controls for this location:

3. **New Orleans, Louisiana:**

   (a) Köppen climate type: Letter code: _____

   Descriptive name: _____

   (b) Dominant climate controls for this location:

4. **Palau, Caroline Islands:**

   (a) Köppen climate type: Letter code: _____

   Descriptive name: _____

   (b) Dominant climate controls for this location:

5. **Irkutsk, Siberia:**

   (a) Köppen climate type: Letter code: _____

   Descriptive name: _____

   (b) Dominant climate controls for this location:

6. **Dublin, Ireland:**

   (a) Köppen climate type: Letter code: _____

   Descriptive name: _____

   (b) Dominant climate controls for this location:

Name _____ Section _____

PROBLEMS—PART II

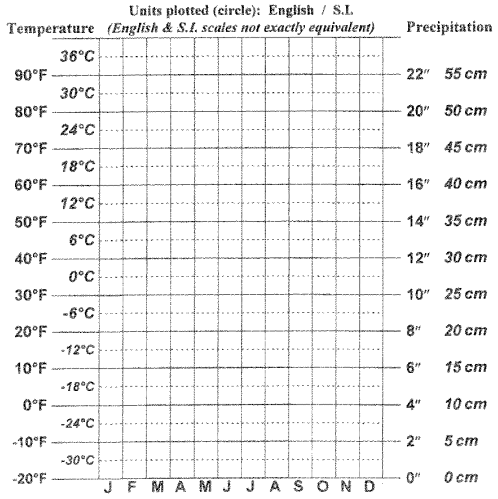
For each of the following six locations, complete the climograph using the average monthly temperature ("Temp") given in degrees Celsius and Fahrenheit, and the average monthly precipitation ("Precp") given in centimeters and inches. The average annual temperature and precipitation are provided for you. After completing the climographs, answer the questions at the end of Part II. You may plot data on the climographs using either S.I. or English units (note that the English unit and S.I. unit scales on the climographs are not exactly equivalent). No "H" climates are given.

1. Average Annual: 10°C (50°F); 31.4 cm (12.3″)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Temp	21°F *−6°C*	30°F *−1°C*	42°F *6°C*	54°F *12°C*	63°F *17°C*	70°F *21°C*	73°F *23°C*	71°F *22°C*	61°F *16°C*	51°F *11°C*	35°F *2°C*	23°F *−5°C*
Precp	0.1″ *0.3 cm*	0.1″ *0.3 cm*	0.3″ *0.8 cm*	0.5″ *1.3 cm*	0.7″ *1.8 cm*	1.5″ *3.8 cm*	2.6″ *6.6 cm*	3.6″ *9.1 cm*	2.2″ *5.6 cm*	0.6″ *1.5 cm*	0.1″ *0.3 cm*	0.0″ *0.0 cm*

2. Average Annual: −12°C (10°F); 13.4 cm (5.2″)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Temp	−20°F *−29°C*	−13°F *−25°C*	−13°F *−25°C*	−2°F *−19°C*	22°F *−6°C*	35°F *2°C*	41°F *5°C*	39°F *4°C*	32°F *0°C*	16°F *−9°C*	0°F *−18°C*	−15°F *−26°C*
Precp	0.1″ *0.3 cm*	0.4″ *1.0 cm*	0.2″ *0.5 cm*	0.3″ *0.8 cm*	0.3″ *0.8 cm*	0.8″ *2.0 cm*	0.3″ *0.8 cm*	0.9″ *2.3 cm*	0.5″ *1.3 cm*	0.7″ *1.8 cm*	0.3″ *0.8 cm*	0.4″ *1.0 cm*



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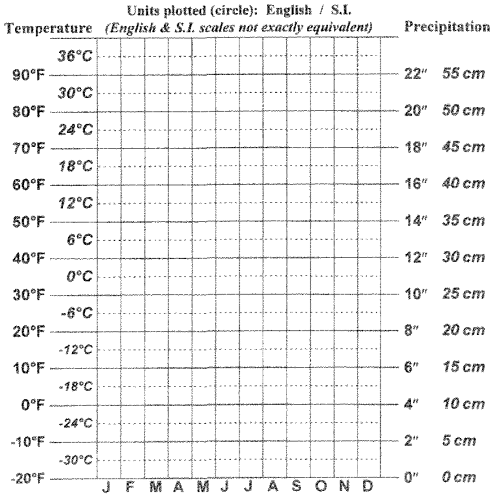

2.

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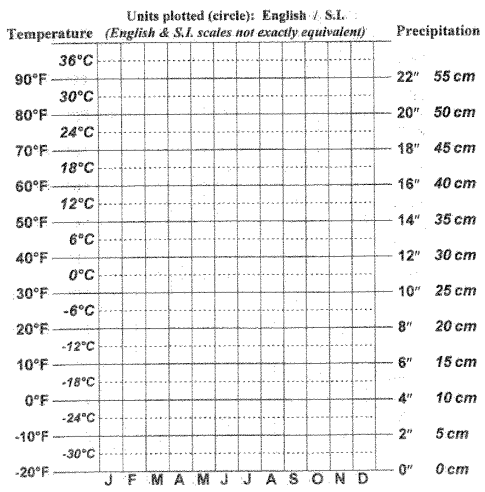
3.	Average Annual: 16°C (61°F); 52.6 cm (20.7″)											
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Temp	69°F *21°C*	68°F *20°C*	66°F *19°C*	61°F *16°C*	57°F *14°C*	55°F *13°C*	53°F *12°C*	54°F *12°C*	57°F *14°C*	59°F *15°C*	64°F *18°C*	67°F *19°C*
Precp	0.4″ *1.0 cm*	0.6″ *1.5 cm*	0.5″ *1.3 cm*	2.1″ *5.3 cm*	3.5″ *8.9 cm*	3.3″ *8.4 cm*	3.3″ *8.4 cm*	2.9″ *7.4 cm*	1.8″ *4.6 cm*	1.2″ *3.0 cm*	0.7″ *1.8 cm*	0.4″ *1.0 cm*

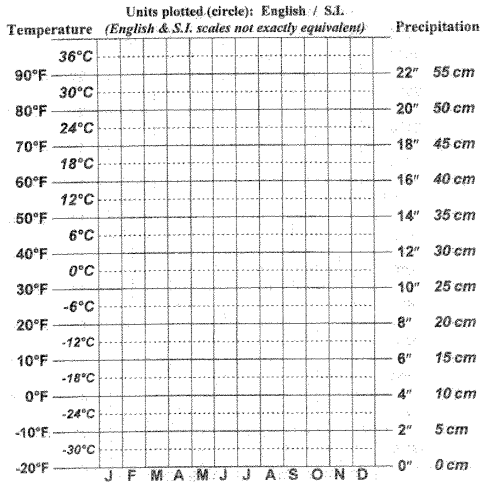
4.	Average Annual: 27°C (81°F); 291.4 cm (114.7″)											
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Temp	81°F *27°C*	82°F *28°C*	84°F *29°C*	85°F *29°C*	84°F *29°C*	80°F *27°C*	79°F *26°C*	79°F *26°C*	80°F *27°C*	80°F *27°C*	81°F *27°C*	81°F *27°C*
Precp	0.8″ *2.0 cm*	0.8″ *2.0 cm*	1.7″ *4.3 cm*	3.7″ *9.4 cm*	11.4″ *29.0 cm*	27.8″ *70.6 cm*	25.3″ *64.3 cm*	12.5″ *31.8 cm*	9.22″ *23.4 cm*	12.9″ *32.8 cm*	6.7″ *17.0 cm*	1.9″ *4.8 cm*

5.	Average Annual: 10°C (50°F); 83.6 cm (32.9″)											
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Temp	25°F *−4°C*	27°F *−3°C*	36°F *2°C*	48°F *9°C*	58°F *14°C*	68°F *20°C*	74°F *23°C*	72°F *22°C*	66°F *19°C*	54°F *12°C*	40°F *4°C*	30°F *−1°C*
Precp	1.9″ *4.8 cm*	1.9″ *4.8 cm*	2.7″ *6.9 cm*	2.9″ *7.4 cm*	3.5″ *8.9 cm*	3.7″ *9.4 cm*	3.3″ *8.4 cm*	3.1″ *7.9 cm*	3.0″ *7.6 cm*	2.6″ *6.6 cm*	2.3″ *5.8 cm*	2.0″ *5.1 cm*

6.	Average Annual: 21°C (70°F); 25.2 cm (9.9″)											
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Temp	84°F *29°C*	82°F *28°C*	77°F *25°C*	68°F *20°C*	60°F *16°C*	54°F *12°C*	53°F *12°C*	58°F *14°C*	65°F *18°C*	73°F *23°C*	79°F *26°C*	82°F *28°C*
Precp	1.7″ *4.3 cm*	1.3″ *3.3 cm*	1.1″ *2.8 cm*	0.4″ *1.0 cm*	0.6″ *1.5 cm*	0.5″ *1.3 cm*	0.3″ *0.8 cm*	0.3″ *0.8 cm*	0.3″ *0.8 cm*	0.7″ *1.8 cm*	1.2″ *3.0 cm*	1.5″ *3.8 cm*

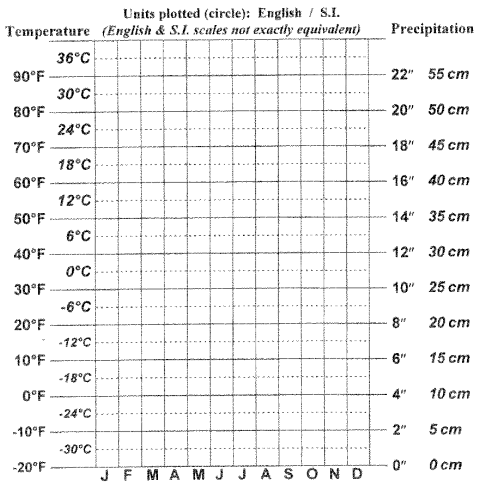


3.



4.

Name _____ (Part II)



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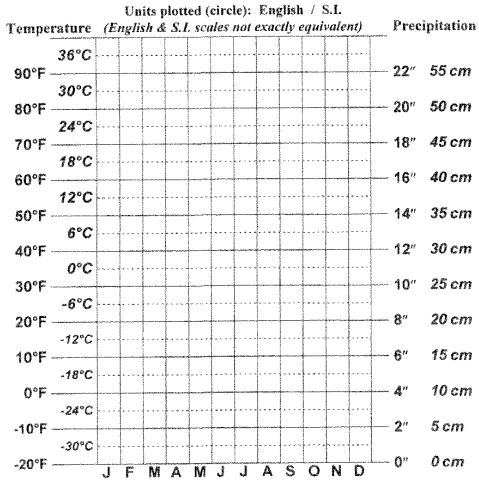

6.

After completing the climographs, assign a Köppen letter code and descriptive climate name to each location:

1. Köppen climate type: Letter code: _____

   Descriptive name: _____

2. Köppen climate type: Letter code: _____

   Descriptive name: _____

3. Köppen climate type: Letter code: _____

   Descriptive name: _____

4. Köppen climate type: Letter code: _____

   Descriptive name: _____

5. Köppen climate type: Letter code: _____

   Descriptive name: _____

6. Köppen climate type: Letter code: _____

   Descriptive name: _____

Name _____ Section _____

PROBLEMS—PART III

Before answering the following questions, assign Köppen climate types to each of the six locations in Part II. Match each of the locations in Part II (1 through 6) with its most likely city from the list below:

Alice Springs, Australia	Cochin, India
Capetown, South Africa	Lanzhou, China
Chicago, Illinois	Barrow, Alaska

1. (a) Most likely city: _____

   (b) Why is this the most likely city?

2. (a) Most likely city: _____

   (b) Why is this the most likely city?

3. (a) Most likely city: _____

   (b) Why is this the most likely city?

4. (a) Most likely city: _____

   (b) Why is this the most likely city?

5. (a) Most likely city: _____

   (b) Why is this the most likely city?

6. (a) Most likely city: _____

   (b) Why is this the most likely city?

Name _____ Section _____

PROBLEMS—PART IV

The following questions are based on the diagram of the Köppen climate distribution on a hypothetical continent (Figure 2). It may also be helpful to compare the hypothetical continent with the map of actual climate distribution shown on the inside cover of the Lab Manual. In answering the questions, consider both the characteristics of a climate and the dominant controls producing that climate.

1. Why are Aw (tropical savanna) climates found in bands north and south of the Af (tropical wet) climates?

2. Why do the Af climates extend farther toward the poles along the east coast than along the west coast?

3. What explains the distribution of BW (desert) climates centered at about 25° to 30° north and south latitude along the west coast?

4. On the hypothetical continent, why does the BW climate extend farther inland in the Northern Hemisphere than in the Southern Hemisphere?

5. What explains the distribution of BS (steppe) climates?

Climate Classification

6. What explains the narrow coastal band of Cs (mediterranean) climates at about 35° north and south latitude along the west coast?

7. Why do the Cfb (marine west coast) climates, just poleward of the dry summer Cs climates, receive rain all year?

8. Why do Cfa (humid subtropical) climates along the east coast receive rain all year, but at the same latitude along the west coast, the Cs climates have dry summers?

9. Why is the Dfb (humid continental) climate in a band just north of the band of Dfa climate?

10. Why is the high latitude interior of the continent dominated by Dfc and Dfd (subarctic) climates?

11. Why are no D or E climates shown in the Southern Hemisphere?

Name _____ Section _____

PROBLEMS—PART V—INTERNET

In this exercise, you will use the Internet to find the climate record of the city where you live, and then classify its climate with the Köppen system.

- Go to the McKnight and Hess textbook Web site, <***http://www.prenhall.com/mcknight***>. Select "Lab Manual," then "Exercise 20." Then select "Go to *Regional Climate Centers*" under NOAA: <***http://www.ncdc.noaa.gov/oa/climate/regionalclimatecenters.html***>. (Your instructor may recommend a different Internet site that provides climate data.)
- From the map of the United States, select the Regional Climate Center for your state, and then look for the historical climate summary for your city.
- To properly classify the climate of your city, you will need the average monthly temperature and average monthly precipitation. The averages should be based on weather data over at least a 25-year period. If you choose not to print out the data, write down the information in the chart on the following page. Also note the years on which the averages are based.
- Indicate if your data are in S.I. or English units.
- Note (or calculate) the average annual temperature and precipitation.
- Use the graph on the following page, complete a climograph for your city.
- Use the "Modified Köppen System Charts" to classify the climate of your city.

As an alternative assignment, your instructor may ask that you classify the climate of a city other than where you live.